A NATIONAL SANITARY QUESTION.

NEW ENTOZOOTIC MALADY:

OBSERVATIONS

ON THE

PROBABLE INTRODUCTION OF THIS FORMIDABLE DISEASE,

AND ON

THE ALMOST INEVITABLE INCREASE OF

PARASITIC DISEASES IN GENERAL,

AS A CONSEQUENCE OF THE PROPOSED EXTENSIVE

UTILIZATION OF SEWAGE.

BY

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LONDON:
GROOMBRIDGE AND SONS,
5, PATERNOSTER ROW.

MDCCCLXV.

PRICE SIXPENCE.

HARRILD, PRINTER, LONDON.

NEW ENTOZOOTIC MALADY.

OBSERVATIONS, Etc.

Fellow Countrymen,—Having recently completed a work on the subject of internal parasites,* I feel I need not apologise for bringing under your notice, in the most cogent manner possible, considerations having an important bearing upon the social welfare, not only of the inhabitants of this metropolis, but also upon the community at large.

I have often thought *that* type of the public mind most strangely constituted which could sympathize with a Müller, but which could offer very few words of kindness or consolation to those whom the murderer had bereaved; yet I can better understand this phase of mental erraticism than the peculiar psychical condition of the man who, during the raging pestilence, would be ready on bended knee, to seek Heaven's intervention, but whose intellectual endowments, nevertheless, would not enable him, under ordinary circumstances, to lend so much as the listening ear, to say nothing of the helping hand, to those who are devoting their life-long energies in the process of seeking out the means whereby epidemics may be more or less completely averted. The public press is the great corrector of these aberrant manifestations, and the blessing it thus confers is incalculable.

To the intelligent, truth-loving mind, it every day becomes more and more clear that pestilences and famines, endemics, epidemics, and other similar disorders are immediately brought about by the operation of secondary causes, the nature of which it is the prerogative of science to unfold; therefore, I make bold to affirm that a large class of diseases still holding their dreaded sway over us, may not only be lessened in their virulence by the application of the proper remedies, but, that not a few of them may be altogether eradicated by the adoption of measures based upon the deductions of sound scientific inquiry. Such

* "Entozoa: an Introduction to the Study of Helminthology, with reference more particularly to the Internal Parasites of Man." By T. Spencer Cobbold, M.D., F.R.S., etc. London: Groombridge and Sons, 5, Paternoster Row.

at least appears to me must be the result in dealing with some of the so-called "helminthiases" or parasitic disorders. In this connection, correct entozoological knowledge is of the highest possible value, for in many instances the helminthologist has it within his power, not only to put you in possession of the key by which you may interpret the phenomena of the disease, but he can also supply another key by which you may shut up, so to speak, the disease itself.

On the title-page of this *brochure* I have hinted the probable introduction into this country of a terrible helminthic malady which, at present, is almost entirely unknown amongst us; and I have further intimated my persuasion that, under certain contingencies, its appearance may not long be delayed. The contingencies in question are such as are especially involved in the carrying out of any one of the proposed grand schemes for the utilization of the sewage of this metropolis. In the interests of humanity I emphatically repeat my apprehensions on this score, and I do so on the very legitimate grounds which the pursuit of an inductive science has opened up to my view—on the basis of a long-continued personal study of the internal parasites which afflict the human body, as well as of those which infest our domesticated animals, and, especially, on the circumstances which bring about their prevalence in particular localities. Hitherto, in my efforts to unfold the natural history of these creatures, I have, of course, encountered the cold shoulder and hostile regards of some whose duty it was to have stood by me in the promotion of a science involving the welfare of my fellows, but I have never failed to observe that a short-sighted policy and mediocrity are twin possessions characterizing the narrow-minded occupant of a fool's paradise.

In Egypt, and apparently throughout North-Eastern Africa generally, and likewise at the Cape, at Natal, and in the Mauritius, there exists a more or less constant and formidable endemic disease, the nature of which was first described by Drs. Griesinger and Bilharz. The disorder, or "helminthiasis," in question is caused by a small parasite or entozoon, which infests the blood-vessels, delighting more especially to take up its abode in the veins connected with the liver and other abdominal viscera; and in these situations it gives rise to very

painful symptoms, followed, in the more advanced cases, by excessive prostration and death. Minuter details respecting the peculiar features of the disease itself it is here quite unnecessary for me to adduce, as those who desire further information on this score have already been informed where to look for it; but I cannot proceed without a passing comment on the extraordinary prevalence of the disease in Egypt, which may readily be realized by the fact that out of 363 *post-mortem* examinations conducted by Dr. Griesinger, these parasites were found in no less than 117 instances. It would, therefore, seem that nearly one-third of the entire population suffer from this parasitic malady.

But, it may be asked, why need we trouble ourselves about a miserable parasite which afflicts our Egyptian brethren, and which also prevails at the southern extremity of the African continent? There is surely no likelihood of its introduction amongst the inhabitants of these islands? I beg pardon. Permit me, in reply, to inform you that not only has the highly characteristic disease been already recognized in one or two persons returning from Natal and the Cape, but that I have myself also removed the fully developed sexually mature parasite from the body of an animal supposed to be very closely allied to man. I mean, of course, one of the monkeys. To Dr. John Harley, of King's College Hospital, belongs the exclusive credit of first detecting the disease in England in the human body; and his interesting memoir on this subject will be found in the recently issued forty-eighth volume of the Transactions of the Medico-Chirurgical Society. Dr. Harley was accidentally led to this discovery by a microscopic examination of the urine of his patients; and by this means he succeeded in demonstrating the presence of the eggs and embryos of this terrible parasite. Thus, therefore, we have distinct evidence that the Bilharzia has been transported hitherward from Africa; and the next proposition which naturally suggests itself to your minds, might, I imagine, be satisfactorily stated in some such way as this:—"Admitting that the African fluke-endemic has been introduced into this country, and, that existing conditions are favourable to the growth and development of the parasite, on what grounds is it to be assumed that the disorder is likely to become naturalized, so

to speak, in this country?" My reply is as follows:—Up to the present time, the conditions necessary for the propagation and complete establishment of the disease amongst us have not yet been sufficiently developed to promote a local origin of the characteristic helminthiasis. In other words, the higher larval stages of the Bilharzia have not yet been distributed or acclimatized in this country, and therefore we are still free from the invasions of the adult parasite; but only once let this distribution commence as a consequence of egg-dispersion on any extended scale, and I know of nothing calculated to prevent the rapid spread of the endemic amongst us. Such a scourge would add yet another serious local ill to the already formidable list of evils to which our British flesh is heir.

Notwithstanding the above remarks, I have not yet, perhaps, made it sufficiently clear to you what this anticipated evil has to do with the great sewage question; or, in other words, you perceive no necessary connection between the utilization of sewage on a grand scale, and the subsequent production of a new parasite-endemic. I regret to say that I do perceive this connection, and therefore it is that I still further request your attention, whilst I endeavour to explain the grounds of this unpalatable persuasion.

Have the kindness to observe that every colonist returning from the Cape is liable to bring this parasitic treasure with him as a "guest" indeed, dwelling in his blood, and feeding on his life-stream. In the advanced stages of the malady, the afflicted individual must frequently evacuate the eggs and their contained embryonic larvæ, which are thus conveyed into the ordinary receptacles of such voidings. There let them remain, or convey them into a cesspool, and no harm follows. If deemed preferable, you may transport them, along with myriads of other human parasite eggs and larvæ into a common sewer, and thence into the sea; still, entozoologically speaking, no harm follows. Here, however, let me invite you to pause; for if, without due consideration, you adopt any one of the gigantic schemes now in vogue, you will scatter these eggs far and wide; you will spread them over thousands of acres of ground; you will place the larvæ in those conditions which are known to be eminently favourable for the development of their

next stage of growth, you will bring the latter in contact with land and water snails, into whose bodies they will speedily penetrate; and, in short, you will place them in situations where their yet higher gradations of non-sexual growth and propagation will be arrived at. After all these changes, there is every reason to believe that they will experience no greater difficulty in gaining access to our bodies here in England than obtains in the case of those same parasites attacking our fellow-creatures, whose residence is found in Egypt, in Natal, in the Mauritius, or at the Cape. In a natural history point of view, it would not be an altogether singular result if, twenty years hence, this parasitic malady should be as prevalent in this country as it is now known to be in particular sections of the African continent. Foreseeing the possibility, not to say probability, of this contingency, am I not right, after years of long study, to raise my voice in the hope of preventing such a disaster? In making this appeal, I do not fear to encounter the criticisms of the press, because our public journals are usually conducted by men of the widest possible range of thought. The tallest men in a crowd see farthest, so is it with the leaders of public opinion.

Long familiarity with parasites in general, and a more or less intimate acquaintance with the metamorphoses they undergo, have rendered me tolerably careless as to my mode of handling and examining these creatures; yet I would not advise the uninitiated to follow this example. There are some parasites which attack the surface of the body, and others which ensconce themselves within the alimentary passages, but in the symptoms they produce, most of their injuries are as flea-bites compared with ravages of the Bilharzia. Others, again, there are which rejoice in occupying your thoracic and abdominal viscera, whilst two or three larval forms delight more particularly in the juices of the human brain. I do not know that the members of the Legislature are more liable to parasites in the head than other folks, but according to the rhyme of Edward Forbes—

> "The red tapeworm is especially fat,
> When lodged in the brain of a diplomat."

The species here indicated, however, is one with which I am at present totally unacquainted. Other parasites ordinarily take up their residence in the muscles and cellular connective

tissues, or, in less technical language, in the flesh of the limbs and trunk. The *Trichina*, which has recently excited so much attention in Germany, may be mentioned as a familiar example. But in this direction I will, for the present, suspend my sentiments, iterating, meanwhile, my persuasion that the "profuse distribution" of sewage tends both directly and indirectly to propagate no inconsiderable variety of parasitic diseases. Only those who possess an intimate personal, practical, and scientific knowledge of the subject are competent to point out which particular parasite species are likely to be favoured by this agricultural process.

In the present *brochure* I do not propose to specify or describe all the helminthiases likely to be established by sewage distribution; neither is it my desire to excite unnecessary alarm; therefore, kindly bear with me whilst, in the next place, I invite you to consider the case of two of our most ordinary tapeworms. Either of the species in question—I won't bother you with their scientific names—is liable to attain a length of from twenty to thirty feet. Their general features are, doubtless, well known to you, and possibly you may regard it as a matter of indifference whether the community harbour in future a few more of these parasitic "guests" than they have hitherto been accustomed to entertain. As a general rule, I will admit that they do little harm to the bearer, who, nevertheless, in the capacity of "host," is seldom proud of his company; besides, if tired of the parasites' companionship, a well-directed dose of male fern will at any time sever this otherwise perfectly legitimate connection. With considerable show of reason, moreover, it may be urged that there is little or no chance of the people becoming more infested than at present, provided only they will abstain from eating underdone meat. Excellent suggestion! Unfortunately, however, as obtains in the parallel case of vaccination, no exhortations on the part of an enlightened profession, backed though its members be by legislative enactments, are sufficient to influence, rightly, certain ignorant and prejudiced portions of the community. They, and their grandparents before them, have been accustomed all their lives to eat underdone meat, and they will continue to indulge in this disgusting propensity in spite of all your demonstrations as to

the impropriety of their doing so. Like Tennyson's Northern Farmer, each one says:—

"I weänt breäk rules for Doctor; a knaws naw moor nor a floy."

And so they continue all to enjoy their underdone rations, including the tapeworm larvæ. Doubtless, also, they could find not a few intelligent friends to take their part. For example, a benevolent member of the society established for the prevention of cruelty to animals might stand forward, and with perfect consistency say, "Hold! you have no right to cook that piece of meat; it contains the larvæ of a highly-organized and most interesting animal, the great human tapeworm. Are you going to half-roast or parboil a living creature? The Almighty made this animal for wise purposes. Has not the creature as much right to live as you yourself have? Do not your abdominal viscera constitute the divinely-appointed territory, the area of which these wonderful animals are specially designed to occupy? Are you prepared to frustrate the intentions of the All-wise, who surely created tapeworms in order that they might 'be fruitful and multiply'? Look at our brethren, the Burates, or Cossacks of the Baikal; they all eat underdone meat, and, therefore, they all enjoy the high privilege of playing the part of 'host' to these interesting 'guests.' You are a cruel fellow. I protest against your roasting any small animal alive!" Very good. This would be a perfectly consistent argument in the mouths of those who, from the kindliest motives, take up the cause of the inferior animals. For my own part, I am proud to believe that I am of more value than many "tapeworms" (which, by the way, infest "sparrows"), and consequently I prefer my meat well cooked.

If the matter stopped here, I would say no more about it; especially since some friendly people have imagined me to be so fascinated with tapeworms as to have ironically expressed their belief that I should grieve to see these charming animals totally eradicated. They, of course, mean that I should be sorry to lose the opportunity of adding to my helminthological cabinet. Without going so far as this, I will freely admit, that unless one is "fascinated," and in earnest, one cannot hope to do good in any walk of life; therefore, hear me further, while I yet thrust this question more prominently before you.

Messrs. Hope and Napier, in their ably-written letter, published in "The Times" of Wednesday, December 7th, quietly remark, that "the real quantity of sewage at our (*i. e.* their) disposal, is only 102,000,000 tons *per annum*," and of this "samples will be sent to all the principal chymists in England for analysis." Very good. Messrs. Hope and Napier probably never thought it worth their while to consult a helminthologist, therefore I beg respectfully to inform them (what their analytical returns will probably fail to do) that I entertain no doubt whatever that the annual mass of the sewage of this metropolis contains millions, billions, nay, possibly trillions, of tapeworm eggs. I beg further to inform those to whom this pamphlet is more immediately addressed, that any one of these tapeworm eggs is capable, under favourable circumstanees, of destroying life. Scatter them broadeast, and you multiply their chances of invasion almost indefinitely. As the matter at present stands, probably not one in ten millions of the freed eggs gains ultimate access to the human frame, whilst of those eggs which actually do enter our bodies, only a very small proportion is destined to produce a fatal result. Nevertheless, I have reason to believe that deaths from this eause are much more frequent than is generally supposed. I know that, on the Continent, Griesinger alone has collected between fifty and sixty sueh cases, and many like instances have been brought under my notice in this country. In the Bibliography and text of my recent work, referenee to these cases may be readily obtained. Only let it be fully borno in mind, that the instances here adduced probably represent the merest fraction of the cases aetually occurring, and you will at once perceivo the nature of the grounds on whieh I base my ealculations as to their real prevalenee. Let it also bo noted how few persons, including professional gontlemon, are familiar with the parasites in their larval stages; and, above all, let it bo observed that the Reports of the Registrar-General ean, by no possibility, give even the most remotely approximativo return as to the aetual number of persons dying of theso particular parasito maladies. This involves no fault on the part of the Registrar-General. In tho naturo of things it cannot, for tho present, be other-

wise. Until late years, indeed, worms were not even categorically specified as a cause of death. In fact, the whole thing is a perfect farce, and will remain so until properly qualified persons are invited to give helminthological instruction to the students of the medical profession. If you take, for example, the return of deaths in London for the week ending November the 26th of the current year, you will find that out of 1677 deaths from all causes, only *one* is placed to the account of "worms." I venture to express my honest belief that *five* would have been nearer the mark. If this latter estimate should gain acceptance, it would place upwards of 250 deaths in the metropolis annually to the account of parasites; but I respectfully submit, that even this estimate is far below the mark; and at the same time I cannot help countenancing certain painful misgivings as to the eventual increase of deaths from this cause.

To show the necessary fallacy of our "returns," let me adduce a familiar illustration. Supposing, as not unfrequently happens, an epileptiform seizure suddenly carries off an individual. An inquest is held; an inspection is made. The medical gentleman is fortunately, perhaps, rather quick-sighted, and he actually detects within the brain-substance a solitary parasite no bigger than a small bean or pea. It has been the cause of death, and the case is, therefore, set down as one of brain disease. The worm, of course, loses all the credit of its slaughtering power. The weekly "report" is deprived of part of that measure of correctness, by which alone its value can be fairly enhanced; and the people are kept in that blessed state of ignorance which, did the parasites but know it, and possess a true blood circulation, would rejoice the heart of many a tapeworm!

I might go on to adduce scores of similar instances. Thus, to give one more, an hydatid abscess—another tapeworm product—forms in a man's liver, and ultimately bursts, causing death. This case is forthwith tabulated with liver diseases! Twenty years ago, when studying professionally under the guidance of that distinguished provincial surgeon, the late Mr. Crosse, of Norwich, a singular case of this kind was brought under my notice. A young lad received a slight blow

on the side from a fellow playmate at school, something burst, and the poor boy died. A *post-mortem* inspection showed that a tapeworm-larva had all along been unconsciously entertained as a guest. The cystic entozoon had burst; but who, I should like to know, would have entered this death as one caused by parasitic disease? Scores are the instances which I might further bring forward, so as to show not only that parasite affections are but little understood, but I could also demonstrate that they are constantly overlooked. I respectfully submit that it would be a public boon to appoint some duly qualified person to report on the prevalence of these diseases in general, and to offer such suggestions, in the interests of public health, as his experience would legitimately enable him to give.

To change the subject matter for a while, and thus agreeably draw off your minds from parasites, let me establish a parallelism of argument by pointing out to you the value of natural history knowledge in a totally different direction. At a recent meeting of the Linnean Society, Mr. George Macleay, F.L.S. (than whom there can be no better authority), stated that, in his opinion, the presence of two foreign plants (*Xanthium spinulosum* and *Medicago denticulata*) alone cost the Australian colonists "probably as much as £500,000 per annum." Mr. Macleay also informs me privately, that in Australia these plants are known as the "Bathurst burr" and "Yellow clover burr," and that the seeds or seed-vessels can only be removed by hand-picking, which is an enormously expensive process. Would it not, therefore, I ask, have been a blessing if some person years ago could have prevented the introduction of these weeds? As another reminder, take the case of the American weed (*Anacharis alsinastrum*), which is one of the nuisances of this country. This plant was introduced some fifty, or it may be sixty, years ago. When Mr. John Gough, the temperance orator, was over here, I took occasion, on meeting him at Mr. Samuel Gurney's, at Carshalton, playfully to remind him of the "advantages" we derived from this American product; whereupon the sharp Yankee was not slow to retort—with injustice, I believe—that the inhabitants of the States had also derived a similar advantage from ourselves, in the shape of a small, flat, bad-smelling,

bed-infesting insect, the ecto-parasitic *Cimex lectularius*, or common bug. Or, to take another case, the late Edward Forbes was in the habit of relating an excellent anecdote, illustrating the practical advantages which the public sometimes derive from the delivery of public lectures on natural history. In one of his popular discourses on jelly-fishes, delivered in a small town in Scotland, he had been demonstrating to the audience how very few grains of solid matter a cart-load of Medusæ would contain, and how useless it would be to distribute these animals over the land as manure. At the close of the discourse, a canny farmer stepped up to the platform, and tendered his thanks for the hint; for, at considerable expense, he had been in the constant habit of collecting and distributing myriads of these creatures, under the impression that his crops would be improved by their presence. Many other instances might be adduced, showing the value of scientific knowledge. In the getting rid of a nuisance, thousands of pounds are freely expended; but comparatively few think of risking a five-pound note in obtaining the advice of a botanist, zoologist, or even of a geologist, though the advice of the latter especially might save them untold treasures. As for the helminthologist, no one ever heard of such a personage. Men of science, too, are frail and faulty like their fellows, and not unfrequently it pleases Providence to "push them from their stool," just at the time when the proportions of their sphere of usefulness are apparently about to assume the most conspicuous dimensions. Such was the fate of the late Professor Edward Forbes, of whom Mr. Dobell cleverly wrote:—

> "Nature, a jealous mistress, laid him low,
> He woo'd and won her; and, by love made bold,
> She showed him more than mortal man should know;
> Then slew him lest her secrets should be told."

This digression, by the way, let us now recur to our friends, the tapeworms, and, more particularly, to their larvæ. I have said, or, at least, I have implied that it is not the full-grown, sexually mature animal that we have so much reason to dread as the same animal in its juvenile condition. This is a point on which I earnestly invite your attention. Respecting the larvæ

which gain admission to our brains, or, in more scientific nomenclature, as regards the *Cysticerci*, whence come they? Probably, I need not stop to explain, in detail, that they represent the metamorphosed stages of still minuter larval forms, or embryos which are derived from the tapeworm egg. Then, again, as to these ova, where do they come from? Doubtless from the tapeworm joints (segments or *proglottides*) abounding in sewage, flourishing in cesspools, and rejoicing, as one might fancy, at the prospect of so soon being let loose by myriads or millions over fertilizing fields and renovated wastes. Even now, not a few of the more fortunate tapeworm embryos are clever enough to make their way into the waters which our poorer brethren imbibe, whilst others are transplanted to our frames in a more direct manner; and if, as I have endeavoured to show (in the work already referred to), one person may infect a whole neighbourhood, proving dangerous to the life of his friends and neighbours, may we not, I ask, but too reasonably conjecture that the wholesale distribution of tapeworm eggs (by the utilization of sewage on a stupendous scale,) will inevitably tend to spread abroad a class of diseases, some of which are severely formidable? So convinced am I of the truth embodied in an affirmative reply to this latter query—so certain am I that parasites are propagated in this particular way—so surely do I foresee unpleasant results (if no steps be taken to counteract the evil), that I feel myself bound to speak out boldly, and to produce no uncertain sound in a matter which most closely concerns humanity.

In contradiction to my views it may, perhaps, be argued that, in those localities where sewage distribution has already been carried on (on a comparatively small scale), no evil results of an entozoological kind have yet been shown to follow. Exactly so. The fact is that no one, at present, has made any particular inquiries on this subject; and, moreover, the nature of the knowledge necessary to obtain correct ideas on this subject is so little understood that, probably, very few persons are competent to report on the matter. No doubt there are many persons who, although possessing very scanty knowledge of parasites, would be most willing (at the shortest notice) to take steps towards the preparation of a report, or any number of

reports, provided only adequate remuneration be forthcoming. An active ignoramus thus employed would in his own person forcibly represent the peculiar charms of parasitic life.

Perhaps it will be thought that the foregoing observations have been penned in a spirit hostile to the interests of those commercial gentlemen who are likely to be concerned in the process of utilizing sewage in accordance with one or other of the proposed schemes. Such an idea, if it exists, should at once be discarded. For my own part, I regard the evidence as to the agricultural value of sewage as perfectly conclusive; but after having laboured incessantly, for years, with the view of making myself practically and scientifically acquainted with the origin and developement of parasites, I have ventured to think myself entitled to express my opinions on this subject publicly, and without reserve. Moreover, in this connection, I am taking a perfectly legitimate course; for, again and again, I have sought to bring this subject before the people through other recognized channels established for the diffusion of scientific and general knowledge. I have not, however, yet obtained a hearing. Doubtless a thorough, deep-rooted, and almost universal contempt for parasites has operated to prevent my carrying out my wishes on this score; nevertheless, I am not discouraged, but believe that, before very long, the leading men of our public institutions will eschew their previous fastidiousness, will be convinced that the social advantages to be derived from the delivery of public lectures on the subject are calculated to do more than counterbalance the (imaginary) disagreeable effects hitherto anticipated from this source, will cordially enter into the views here enunciated, and will thus finally confer upon the people a lasting benefit. Should this result be achieved, my foremost thought will be one of gratitude to Heaven that an arduous professional study, of more than twenty years' duration, will not have been totally unproductive of good to those whose attention is solicited at the commencement of this *brochure*.

T. SPENCER COBBOLD.

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